



S-Lite User Guide

Part No. 875-0194-000 Rev C1



This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

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Hemisphere GPS Precision GPS Applications

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Patents

The Outback S™ and S-Lite™ automated navigation and steering guide system is covered by U.S. Patents No. 6,539,303 and No. 6,711,501. The Outback Hitch™ automated hitch control system is covered by U.S. Patent No. 6,631,916. The Outback eDriveTC™ GPS assisted steering system is covered by U.S. Patent No. 7,142,956. Hemisphere GPS products may be covered by one or more of the following U.S. Patents:

6,111,549	6,397,147	6,469,663	6,501,346	6,539,303
6,549,091	6,631,916	6,711,501	6,744,404	6,865,465
6,876,920	7,142,956	7,162,348	7,277,792	7,292,185
7,292,186	7,373,231	7,400,956	7,400,294	7,388,539
7,429,952	7,437,230	7,460,942		

Other U.S. and foreign patents pending.

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Chapter 1: Introducing Outback S-Lite

Overview

What's Included

Overview

The Outback S-Lite™ introduces a new level of value and performance to the Outback Guidance® product family. The new design combines the market-proven Outback S™ simplicity together with the latest developments in Crescent® GPS receiver technology. This powerful combination will be the platform for years of future upgrades and additions.

- If you are a **first time user of Outback products**, acquaint yourself with the instructions contained in this manual. You will find many useful tips and suggestions to help you get the most from your investment.
- If you are an **experienced Outback S user**, you will find the new Outback S-Lite user interface very familiar and immediately appreciate the numerous enhancements that have been made. Hemisphere GPS suggests that you acquaint yourself with these new features.



What's Included

Figure 1-1 shows the parts that comprise the S-Lite system and Table 1-1 provides part numbers and descriptions.



Figure 1-1: S-Lite parts

Table 1-1: S-Lite parts list

Item	Part No.	Description	Qty
A	150-1013-000	Antenna, 1575.42 MHz	1
B	054-0100-000	CLA power adapter cable	1
C	051-0167-000	PWR (power)/GSI cable	1
D	601-0003-005	Disk, 3-3/8" diam, 3/16" zinc	1
E	604-0019-000	4-part suction cup base (mounting hardware)	1
F	803-0051-000	Outback S-Lite GPS receiver (console)	1
Not shown	683-0001-008	Foam pad, circ, 3.0" diam, 0.045	1





Chapter 2: Getting Started

Overview

Installing the Outback S-Lite

Powering Up the Outback S-Lite

Configuring the System

Overview

Before using the Outback S-Lite for the first time, you need to complete the following tasks:

- Installing the Outback S-Lite
- Powering the Outback S-Lite
- Configuring the system



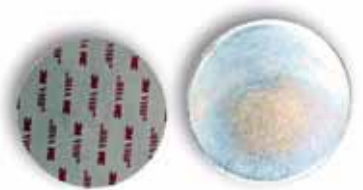
Installing the Outback S-Lite

Correct installation of the Outback S-Lite is critical for safe and correct operation. Correct installation includes determining the location to install components as well as the actual installation of them and the routing of associated cabling. Components that you need to correctly locate, install, and route are the antenna, the console, the antenna cable, and the power cable.

Mounting the Antenna

Make sure to install the antenna in a location that will optimize its performance. It should be centered (left and right) on the vehicle as high and as far forward as possible, usually along the leading edge of the vehicle cab. Do not place the antenna within 2 feet of a transmitting radio antenna (such as a 2-way or business band radio).

1. Clean and dry the surface where the antenna mounting plate will be attached.
2. Remove the paper backing from one side of the adhesive disk and attach to the back of the antenna mounting plate.
3. Remove the paper backing from the other side of the adhesive on the mounting plate.
4. Position the mounting plate and press down hard for good adhesion.
5. Place the magnetic mounted antenna on the plate and be sure it is on the exact centerline of the vehicle



Preparing the Console for Mounting

1. Attach the RAM ball mount securely to the back of the S-Lite console.



2. Install the RAM pedestal to the vacuum cup using the two self-tapping screws provided. Tighten the screws securely.



3. Attach the RAM pedestal to the RAM ball on the back of the S-Lite console.



Mounting the Console

Normally, you mount the console above and behind the center of the steering wheel just below the driver's line of sight. The easiest installation is on the front glass of the cab. If this is not possible, you can vacuum mount the assembly to any non-porous (metal) surface.

1. Thoroughly clean the inside cab window surface directly in front of the steering wheel.
2. Press the vacuum mount to the window and twist the actuator until it clicks over center to create adhesion to the glass.
3. Loosen the RAM mount and adjust the console to the proper viewing angle.



Note: Do not leave the console unattended for extended periods of time. If possible, remove the unit from the glass when it is not in use. Continued exposure to the elements (such as direct sunlight) may damage the suction cup. To extend the life of the suction cup, clean it periodically with a product like Armor All[®].



Routing the Antenna Cable

Remember to always turn off the unit before attaching or removing cables.

1. Route the cable to a cab opening where rubber protection exists that will protect the cable (a closed window works fine).

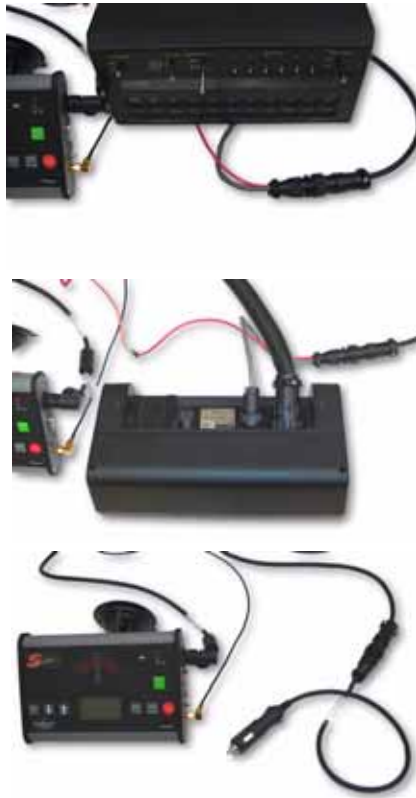


Note: Do not bend the cable to a radius of less than 6 inches. Avoid routing it within 12 inches of radio wires, power generator wires, a heat source, or moving parts.

2. Attach the end of the cable to the console.
3. Coil excess cable in a protected location and secure the installation with tie straps.



Providing Power for the Outback S-Lite



There are two methods of providing power for the S-Lite:

- You can connect the standard power cable directly to a compatible rate controller speed sensor port.
- You can attach the provided CLA adapter to power the S-Lite from a 12 VDC power port. The standard power cable supplied with the S-Lite is compatible with rate controllers that require a Dickey John speed sensor connection. An optional cable is available from Outback Guidance to allow connection to rate controllers that require a Raven speed sensor connection.



1. Connect the power cable to the console at the PWR/GSI port.
2. Twist the connector firmly until it snaps into place.
3. Connect the power cable to the power supply, either from your rate controller or 12 VDC power port.
4. Coil excess cable in a protected location and secure the installation with tie straps.

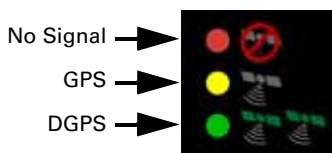
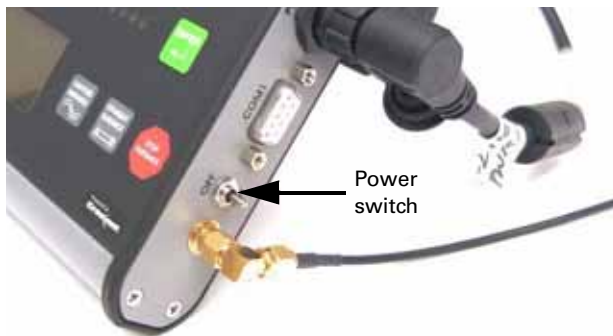


Note: Cigarette lighter sockets are notorious for intermittent power. For permanent installations, it is best to remove the cigarette lighter plug and hard-wire the leads to a reliable 12 V power supply.



Powering Up the Outback S-Lite

Toggle the power switch located on the right end of the console. The unit will complete an LED self test after which the RED status light illuminates indicating No Signal.



The unit automatically begins acquiring a DGPS signal. This process may take a few minutes. During this process, the vehicle can be moving or the operator can perform menu functions. Upon achieving a GPS signal, the YELLOW status light illuminates. Finally, once the Outback S-Lite has acquired a DGPS correction signal, the GREEN status light illuminates. The GREEN DGPS light must be illuminated for the Outback S-Lite to provide guidance.

Note: The antenna must have a clear view of the sky to acquire a DGPS signal.



Configuring the System

You configure the system by setting various values in the Setup menu and the Service menu.

Using the Menu

1. To access the menu, press the MENU button.
2. Select an item by using the UP and DOWN ARROW buttons. The ">" character points to the active menu item.
3. Press the ENTER button to select.



Setup Menu

<u>Setup Menu</u>	
Brightness	5
Swath Width	30.00
Sensitivity	Medium
Perimeter Setup	Right
Diagnostics	>
Service Menu	>

Menu Item	Display Sequence	Default	Description
Brightness	Brightness > 5	[1 to 10] Default = 5	Adjusts the display brightness. 1 is dim, 10 is bright. The LEDs also brighten or dim as you adjust this setting.
Swath Width	Swath Width > 30.00 ft	[3.4 ft to 3280.67 ft] Default = 30.00 ft	Adjust this number to equal the width of the implement or boom.
Sensitivity	Sensitivity >Medium	[Low, Medium, High] Default = Medium	Adjust the manual guidance indicator sensitivity to LOW, MEDIUM, or HIGH.
Perimeter Setup	Perimeter Setup >Right	[Left, Center, Right] Default = Right	Select RIGHT, CENTER, or LEFT edge of swath width for field perimeter area calculation (see "Calculating the Area of a Field" on page 26).
Diagnostics	See "Diagnostics" on page 38.		
Service Menu	See "Service Menu" on page 16.		



Service Menu

Service Menu	
Correction Type	SBAS
SBAS Satellite	AUTO
NMEA Port Setup	>
Unit of Measure	Feet
Language	English
Reset Defaults	>

Menu Item	Display Sequence	Defaults	Description
Correction Type	Correction Type >SBAS	[SBAS, e-Dif] Default = SBAS	See Chapter 4, "Differential Correction Types."
SBAS Satellite	SBAS Satellite >AUTO	[AUTO, W122, W134, W135, W138, E120, E124, E126, E131, M129, M137] Default = AUTO	Optional menu item appears only if you select SBAS as the correction type.
NMEA Port Setup	See Chapter 5, "Communicating with Third Party Applications."		
Unit of Measure	Unit of Measure >Feet	[Feet, Meters] Default = Feet	Select desired unit of measure as feet or meters.
Language	Language >English	Default = English	Select desired language. Multiple languages are supported.
	Language options vary depending on the language group installed on your unit. Contact Outback Guidance Customer Service for questions regarding language groups.		
Reset Defaults	Reset Defaults ENTER to Reset		Select this option to reset factory defaults.



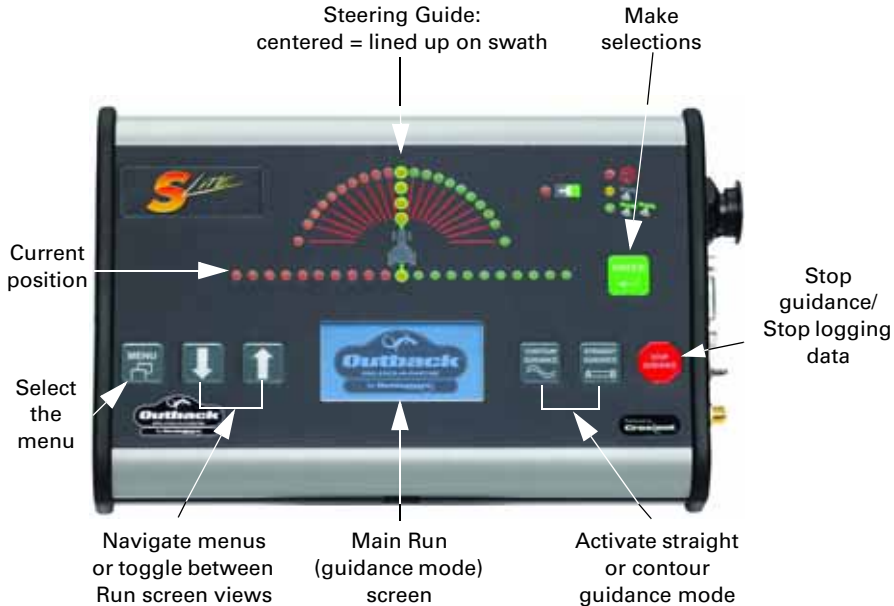


Chapter 3: Using Guidance Features

- Guidance Overview
- Status Indicators
- Main Run Display Screens
- Additional Display Screens
- Using Straight Guidance
- Using Contour Guidance
- Calculating the Area of a Field
- Stopping Guidance

Guidance Overview

Below is an at-a-glance overview of the Outback S-Lite console:



Outback S-Lite provides two main guidance options:



Straight guidance - predefined parallel passes. You can drive linear or circular passes.



Contour guidance - freestyle guidance. You can drive freestyle passes relative to any previous pass.



Table 3-1 summarizes the features available in straight and contour modes. In addition to the two main guidance options, you can calculate the area of a field in contour mode.

Note: It is important to press the STOP GUIDANCE button whenever the unit is not guiding. During guidance, the Outback S-Lite records all movement. Pressing STOP GUIDANCE tells the unit not to guide and not to record movement.

Table 3-1: Contour and straight guidance summary

Item	Contour Mode	Straight Mode
Mode Of Operation	Freestyle. Guide relative to any previous pass.	Predefined parallel and numbered passes. Passes can be straight or circular.
Work Recorded In Memory	Yes. In fact, the recorded pass defines where the next pass will be guided.	Yes. Although recorded work in Straight mode is not used for guidance, it will be used if you switch to Contour mode and then want to make a pass along previous work.
A=B Points Required	No. Guidance is based on previous passes.	Yes. The A=B defines the first pass and then all other passes are laid out automatically.
Guides from Previous Pass	Yes. Once the Outback S-Lite “sees” another previous pass close by, it automatically begins to guide on that pass. Wherever the previous pass goes will guide the next pass.	No. Straight guidance only looks at predefined parallel lines spaced by the width of the implement, as entered in the Swath Width menu.
Numbered Passes	No	Yes. The first A=B line is pass #0. Passes to the right increment +1, +2, etc. and passes to the left decrement -1, -2, etc.



Table 3-1: Contour and straight guidance summary (*continued*)

Item	Contour Mode	Straight Mode
Swath Width Integrity Across The Field	No. Because guidance is always working from the last pass, driving errors add as the vehicle works across the field. Each pass redefines the next pass.	Yes. Because guidance is always looking at predetermined parallel lines, all passes will be in perfect multiples of the swath width. This works well when planting, harvesting, ditching, and furrowing.
Switching Modes	Yes. You can switch Outback S-Lite guidance modes by pressing the STRAIGHT GUIDANCE or CONTOUR GUIDANCE buttons. When switching to Straight mode, you have the option of using a previously defined A=B line, or setting a new one.	Yes. You can switch from Straight to Contour at any time. Contour mode will recognize passes previously done in Straight mode.
Skip Passes?	If an area is skipped, the unit will recognize it as a new pass and continue logging. The unit can either guide off the new pass or continue guiding off the old passes.	Yes. You can complete passes in any order desired. They will still be uniformly spaced across the field.

Status Indicators

The Headland Alert indicator lights when the vehicle crosses into a previously applied area.

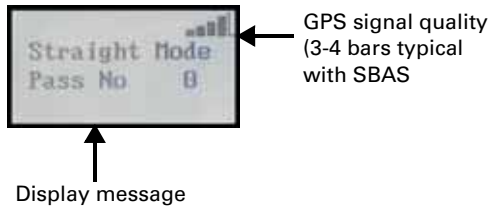
Headland 



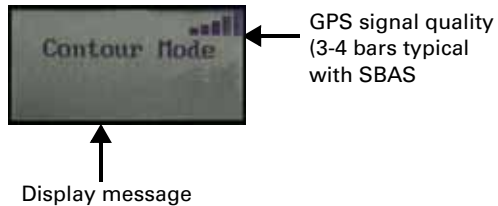
Main Run Display Screens

The Outback S-Lite has two main run display screens: the Straight Guidance Mode screen and the Contour Guidance Mode screen. You can access additional display screens from both these main run screens.

Straight Guidance Mode



Contour Guidance Mode

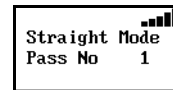


Additional Display Screens

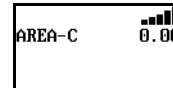
While operating in either Contour or Straight guidance modes, the arrow keys will present additional display screens.

- Repeatedly pressing the DOWN ARROW button displays the following screens.
- Repeatedly pressing the UP ARROW displays the additional screens in the reverse order.

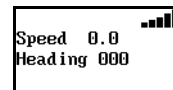
Main Run Screen



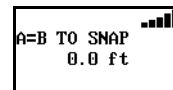
Perimeter Area



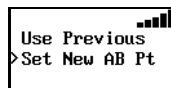
Ground Speed and Heading Screen



Snap A=B Screen

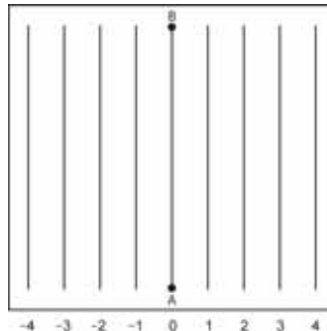


Select Straight guidance to generate parallel paths for the unit to follow. When you press the STRAIGHT GUIDANCE button the following menu appears:



Using Straight Guidance

The first pass can either be established along a straight side of the field, or it can divide the field with a straight swath working out each side. Either way, all passes will be perfectly and uniformly spaced across the field.



Setting the A=B Line

The A=B line is an imaginary line that passes through two points to define the first pass. All other passes are perfectly spaced on both sides of the first pass.

Marking Point A and Point B While Driving

1. Position the vehicle at the beginning of the first pass.
2. Press the STRAIGHT GUIDANCE button.
3. Select SET NEW AB on the display screen and press the ENTER button.
4. Press the ENTER button to mark Point A.
5. Drive the first pass.
6. At the end of the pass, press the ENTER button to mark Point B.

Use Previous
>Set New AB Pt

Press Enter
For Point A

Press Enter
For Point B

Begin Straight Guidance

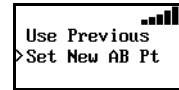
After setting the A=B line, the unit automatically begins guiding.

1. Turn the steering wheel in the direction indicated by the Steering Guide lights to remain centered on the current pass.
2. At the end of the current pass, turn around. The unit will automatically detect the next pass and begin guiding.



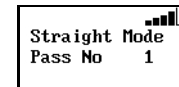
Switching Modes

You can switch Outback S-Lite guidance modes by pressing the STRAIGHT GUIDANCE button or the CONTOUR GUIDANCE button. When you switch to Straight mode for the second time, you have the option to use the previous A=B line or set a new one.



Pass Numbering

Once the A=B line is established, all passes will be numbered. While turning around at the headland, the nearest pass number is displayed. You can work passes in any order.



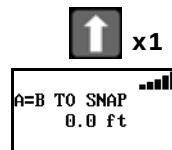
Adjusting the A=B Line

While operating in Straight guidance mode, you can adjust the A=B line on-the-go without interrupting normal guidance operation. This feature is especially useful to correct for DGPS drift over time.

- **A=B to Snap:** You can “snap” the A=B line to the vehicle’s current location parallel to the original A=B line. The Snap A=B feature is best used to insert a desired gap between consecutive parallel swaths (such as a conservation barrier strip).

Snapping the A=B line to the current location

1. While in Straight guidance mode, press the UP ARROW button once to display the SNAP TO A=B screen.



2. Press the STRAIGHT GUIDANCE button. This causes the nearest A=B guide line to be aligned with the current vehicle position (snap A=B to here).
3. Press the DOWN ARROW button to return to the Straight guidance screen.

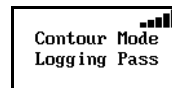


Using Contour Guidance

Select Contour Guidance to follow previous passes. In this mode, the Outback S-Lite is either logging an initial pass or guiding from a previous pass. After selecting Contour guidance, proceed by making the initial pass without using the Steering Guide lights. Later, when attempting to follow a previous pass, the guidance will engage. You generally use Contour Guidance for working out borders, turn areas and contour following.



1. Press CONTOUR GUIDANCE before beginning the initial pass. The display shows "LOGGING PASS".
2. Make the initial pass without using the Steering Guide.
3. At the end of the current pass, turn around and begin the next pass. The unit will automatically detect the previous pass and begin guiding.



Guiding on Subsequent Passes

Anytime the vehicle is within half a swath width of a previously logged pass, the Outback S-Lite automatically begins to guide. In Contour mode, the Outback S-Lite can guide from any previous pass, even those made in Straight guidance mode.

Making A New First Pass

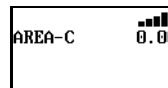
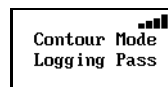
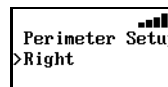
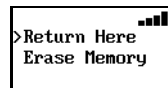
Occasionally a situation arises in the middle of a job when a pass will need to be made that follows a different path than the previous passes. Simply drive the new path. Once it becomes obvious that a new pass is being defined, the unit goes into logging pass mode. Subsequent passes are guided from this newly defined pass.



Calculating the Area of a Field

At the beginning of each new field, you can use the Outback S-Lite to calculate the field perimeter area of the first contour pass around the field.

1. Press the STOP GUIDANCE button.
2. Press the DOWN ARROW button.
3. Select ERASE MEMORY from the display screen.
4. Press the ENTER button.
5. Press the MENU button.
6. Select PERIMETER SETUP from the display screen.
7. Press the ENTER button.
8. Select RIGHT, LEFT, or CENTER, to set which swath width position will be used to calculate the perimeter.
9. Press the ENTER button.
10. Press the CONTOUR GUIDANCE button.
11. Drive the vehicle around the outside edge of the field. The main guidance screen will display "LOGGING PASS".
12. Press the DOWN ARROW button to display the perimeter area calculations. The displayed AREA-"x" shows the current perimeter setup selection where "x" is L=left, C=center, or R=right.



The calculations continuously update until the vehicle is within one swath width of the starting point. Then the unit automatically closes the perimeter and displays the final calculations.

Note: The units for the area calculation are Acres if the unit of measure is set to Feet, and Hectares if the unit of measure is set to Meters.



Stopping Guidance

It is important to use the Stop Guidance feature whenever the unit is not guiding. During guidance, the Outback S-Lite records all movement. Pressing the STOP GUIDANCE button tells the unit not to guide and not to record movement. There are several additional features that you can use in conjunction with the Stop Guidance feature.



Table 3-2: Stop Guidance feature summary

Hold	Stops logging. Use during turns or to relocate.
RETURN HERE	Saves the job and the ending point for later return.
RTRN PREV PT	Starts guidance to take you back to a previously saved point.
UPDATE e-Dif	Optional menu item if the correction type is set to e-Dif. Resets e-Dif correction to match current position with previous return point.
ERASE MEMORY	Clears memory in preparation of a new job.

Hold Logging Data/Guiding

Use the Hold feature to stop logging data during turns or to relocate to another section of the field.

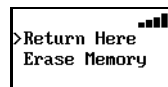
1. Press the STOP GUIDANCE button. Do not select any available menu items.
2. To resume guiding and logging data, press either the STRAIGHT GUIDANCE button or the CONTOUR GUIDANCE button.
The system prompts to use the previously defined A=B line.
3. Press the ENTER button to continue with the current job.



Return Here

Use the Return Here function to suspend application in order to reload or at the end the day. It saves the job and records the end point, allowing the unit to restart exactly where it left off.

1. Press the STOP GUIDANCE button.
2. Select RETURN HERE on the screen and press ENTER.



3. Press either the STRAIGHT GUIDANCE button or the CONTOUR GUIDANCE button.

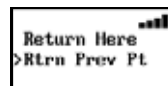
The system prompts to use the previously defined A=B line.

4. Press the ENTER button to continue with the current job.

Return to Previous Point

Using the Return to Previous Point function to have the unit guide back to a previously saved point.

1. Press the STOP GUIDANCE button.
2. Select RTRN PREV PT and press ENTER. The unit will guide to the saved point.



3. At the saved point, press either the STRAIGHT GUIDANCE button or the CONTOUR GUIDANCE button.

The system prompts to use the previously defined A=B line.

4. Press the ENTER button to continue with the current job.

Update e-Dif

The Update e-Dif function is activated when the Correction Type is set to e-Dif. Anytime field operations are suspended (for hours or days) the Update e-Dif function allows guidance to resume without interruption by resetting the e-Dif correction to match the current starting point with the previously recorded return point.



1. At the end of an application, create a return point using the steps for the Return Here function. In addition, establish a physical mark in the field corresponding to the ending position. The physical mark should be easy to drive back to at a future time.
2. When resuming the application, return to the ending position. You may use the Return to Previous Point function (up to Step #4) to get nearby, but it is important to return to the same physical location.
3. After returning to the ending position, press the STOP GUIDANCE button.
4. Select UPDATE E-DIF from the displayed menu.
5. Press the ENTER button.

Note: The system displays “UPDATE OK” if the corrections have reset properly. If the system encounters an error in resetting the corrections, it displays “NOT YET UPDATED”

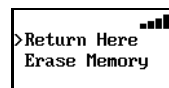
6. Resume guidance by pressing either the STRAIGHT GUIDANCE button or the CONTOUR GUIDANCE button.

Erase Memory

The Erase Memory function removes all recorded passes and points for the job to prepare for a new job. You normally do this at the end of each field.

Note: There are 30.56 hours of total memory available. If you do not erase memory between fields, it will fill up. If this happens, a “MEMORY FULL” message appears. Use the ERASE MEMORY function to clear the memory.

1. Press the STOP GUIDANCE button.
2. Select ERASE MEMORY.
3. Press the ENTER button.



The system will erase all data and return to the Menu.





Chapter 4: Differential Correction Types

Differential Corrections Overview

Using e-Dif

Differential Corrections Overview

The differential correction type used by the Outback S-Lite is selected from the two GPS applications loaded into the receiver. You can change the correction type from the CORRECTION TYPE item in the Service menu (see “Service Menu” on page 16). Select SBAS, e-Dif, or other field-installed correction option(s).

- For North American distribution, SBAS (WAAS) is the factory installed option. WAAS is free and is available throughout most of North America.
- For European distribution, SBAS (EGNOS) is the factory installed option. EGNOS, like WAAS, is also free and is available throughout most of Europe.
- For all other locations that do not have access to SBAS corrections like WAAS or EGNOS, e-Dif is the factory installed option. Use of e-Dif requires no additional hardware.

Note: e-Dif, as factory installed, is pre-activated with a one-time primary subscription for use anywhere in the world. The use of e-Dif on Outback Guidance equipment as a GPS differential correction is intended only for relative guidance applications and is not recommended for data recording and subsequent comparative analysis. Relative positional accuracy will typically drift at a rate of 1-2 meters (3-6.5 feet) per hour; however, absolute positional accuracy errors may approach ± 10 meters (± 33 feet).



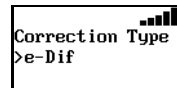
Using e-Dif

The patented e-Dif correction method uses only the standard GPS satellites and does not require an external correction signal of any type.

e-Dif works by analyzing the error trends from the GPS satellites and projects new correction values into the future. This technique is stable and accurate within short time frames making it perfect for progressive pass-to-pass guidance. As long as each pass is within a few minutes of the last pass, the accuracy performance is excellent.

Selecting e-Dif

To configure Outback S-Lite for use with e-Dif, simply select e-Dif as the correction type from the Service menu.

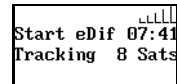


To then use Outback S-Lite with e-Dif, follow the general directions in this manual with the following exceptions.

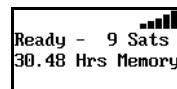
Power On Initialization and DGPS Lock

After turning power on to the Outback S-Lite, the system must track GPS satellites for up to 10 minutes before differential corrections can be generated. The vehicle may be moving or stationary during this time.

While tracking, the Outback S-Lite will show the GPS light and will display the number of satellites being tracked.



Once the unit is finished tracking, the DGPS light will show and READY will be displayed.





Chapter 5: Communicating with Third Party Applications

Available Applications
Changing Default Settings

Available Applications

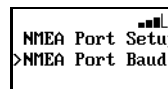
The DGPS signals of the Outback S-Lite can be shared with third-party mobile applications.

Any application designed to receive DGPS signals from an external receiver over an RS-232 serial interface using NMEA 0183 messages will work with the Outback S-Lite. Various connecting cables and kits are available for such applications as yield monitors, rate controllers, laptops, PDAs, etc.

For successful communication, you must configure both the Outback S-Lite console and the external application to communicate in the same way. Many applications can use the default communication protocol; however, some applications may require alteration from the default settings.

Changing Default Settings

You can change the default communication settings from the NMEA PORT SETUP item in the Outback S-Lite Service menu.



- To change the NMEA message, select NMEA PORT SETUP.
- To change the baud rate, select NMEA PORT BAUD.

The following options are available (default options are in bold):

1. NMEA PORT BAUD: 19200, 9600, **4800**.
2. GGA RATE: OFF,.2 HZ, **1 HZ**, 5 HZ,.
3. GLL RATE: **OFF**,.2 HZ, 1 HZ, 5 HZ.
4. VTG RATE: OFF,.2 HZ, **1 HZ**, 5 HZ.
5. RMC RATE: **OFF**,.2 HZ, 1 HZ, 5 HZ.
6. GSA RATE: **OFF**,.2 HZ, 1 HZ, 5 HZ.
7. ZDA RATE: **OFF**,.2 HZ, 1 HZ, 5 HZ.

Note: If the higher rate of 5 HZ is selected then a faster NMEA PORT BAUD rate should also be selected (ex. 19200) to facilitate proper communication.





Appendix A: Troubleshooting

Diagnostics

Troubleshooting

Frequently Asked Questions

Diagnostics

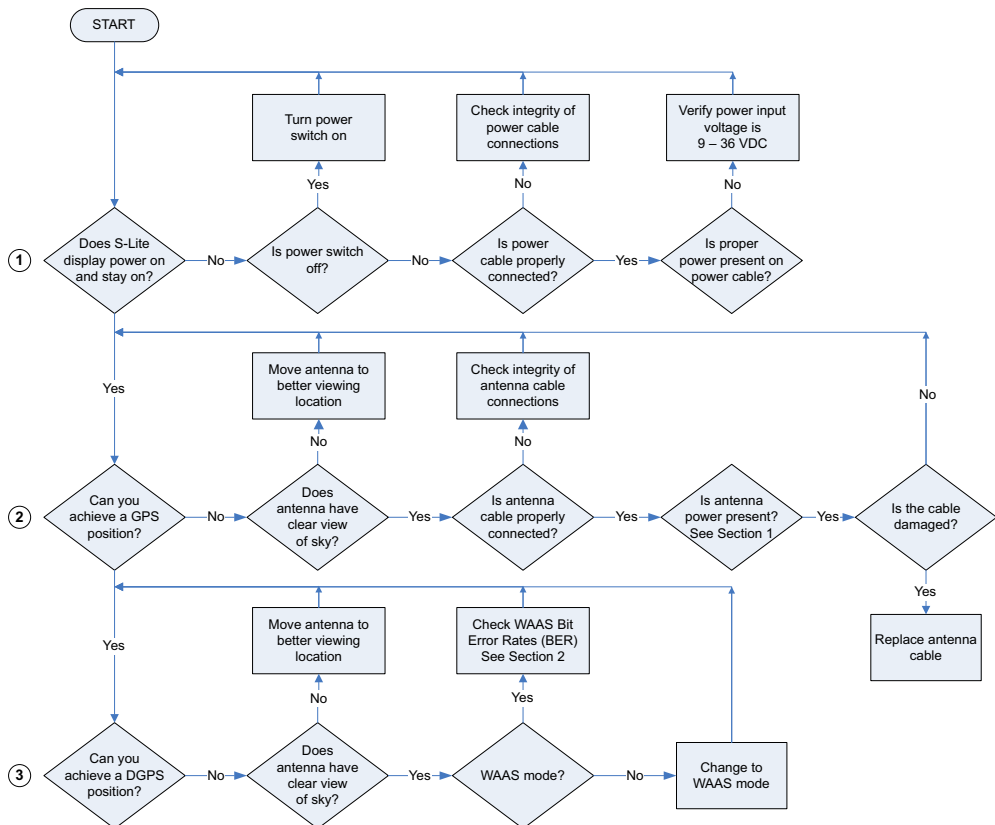
Table A-1 provides helpful S-Lite operating/troubleshooting information.

Table A-1: Helpful operating and troubleshooting information

Item	Description
CORRECTION TYPE	Displays the type of differential correction being used. There are two GPS applications loaded into the receiver. SBAS is the factory installed default, while you may select e-Dif for use where SBAS is not available.
SATS: TRK=08 USE IN CALC=08	Tells the number of GPS satellites currently visible in the sky (does not include correction satellites).
STDEV	Pseudo-estimate of the DGPS solution accuracy determined as the RMS value of the positional residual errors. STDEV is valid only if 6 or more satellites are used in the solution calculation. Typical values for SBAS correction are 0.15 m - 0.45 m (0.5 ft - 1.5 ft).
HDOP	The Horizontal Dilution of Precision indicates the influence of the current GPS satellite constellation geometry on the horizontal accuracy of the position solution. Lower values of HDOP indicate better geometry. Typical values are 0.8 - 2.0.
DIFF AGE	This indicates the age of the RTCM corrections used in the DGPS calculation. Optimal operating values are < 7 sec.
BIT ERROR RATE	Relative strength of the correction satellite(s). In the case of WAAS, two numbers are shown separated by a hyphen. The number can be from 0 to 500, with 0 being good and 500 being bad. See page 40 for a more detailed explanation.
GPS SOFTWARE VER	GPS software version.
APP SOFTWARE VER	Application software version.
SERIAL NUMBER	Serial number of the unit. It should match the number on the serial number tag on the back of the unit.
MEMORY	Amount of remaining memory (in hours). All passes are recorded in memory until erased at the end of each field. To clear the memory, press the STOP GUIDANCE button and select the ERASE MEMORY menu item.



Troubleshooting



1) Check Power by Testing Antenna Voltage

The Outback S-Lite antenna is an “Active” antenna that requires power to operate. This power is supplied to the antenna by way of the coaxial cable connecting it to the Outback S-Lite console.

Testing the antenna voltage can verify that the:

- Outback S-Lite receiver is supplying power to the antenna
- Antenna cable is not damaged



Procedure

1. Turn off the Outback S-Lite console.
2. Disconnect the coaxial cable from Outback S-Lite console.
3. Turn on the Outback S-Lite console.
4. Using a voltmeter set to VDC, measure the voltage output across the antenna output on the console. If the measurement is +5 VDC at the console connector, then the antenna cable could be damaged. Replace the coaxial cable and return to step 1.
5. If the measurement is not +5 VDC from the Outback S-Lite console, contact Outback Customer Service to return the console for servicing.

2) Check for GPS Position

Following procedure on troubleshooting chart

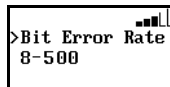
3) Check for a DGPS Position by Verifying the Bit Error Rate (BER)

You can view the bit error rate (BER) for the Outback S-Lite receiver via the Diagnostics menu (a screen on this menu contains the BER).

The BER is a check of the quality of the correction signal reception. The Outback S-Lite uses a scale of 0 to 500 to indicate signal quality. BER values < 20 are ideal. If the BER > 20, ensure the antenna has a clear view of the sky for it to properly find and track the correction satellites.

When using WAAS for the correction type, the Outback S-Lite can track one or two correction satellites. Both of these sources will have a different BER and will be displayed with a hyphen separating the two values.

For example, a value of 8-500 means that the Outback S-Lite has a very good signal on one satellite (8) and is not receiving corrections from the other satellite (500). Only one satellite must have a low BER value to provide differential corrections.



Frequently Asked Questions

About GPS Guidance

Q: What is GPS?

A: GPS stands for Global Positioning System. It is a satellite-based signal operated by the U.S. Department of Defense and is available to anyone to provide position information to receivers on the ground. Several satellites are used by the receiver to pinpoint the exact position. For more information, go to:

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/gps/

Q: What is DGPS?

A: The D stands for Differential Correction. It just means that a second signal is used to correct inherent errors in the GPS signal making it even more precise. The Outback S-Lite can utilize WAAS corrections in North America.

Q: What is WAAS?

A: WAAS stands for Wide Area Augmentation System. It is a satellite-based correction signal operated by the U.S. Federal Aviation Administration and is free to those who use it. The service works throughout most of North America from Mexico north to the 55th parallel in Canada. WAAS is currently not available anywhere else in the world. For more information about WAAS contact the FAA at:

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/waas/

Q: What is e-Dif?

A: e-Dif is a Hemisphere GPS patented technology capable of achieving GPS accuracies of a few feet without the need for a differential signal broadcast. e-Dif generates internal differential corrections based on the starting location. The differential corrections are modeled over time and applied to the GPS data to maintain a very consistent relative position. The operator can use e-Dif over long time periods with minimal drift in accuracy or return to the starting location at any time to update the differential corrections.



Q: How accurate is Outback S-Lite DGPS?

A: Using WAAS corrections and operating under normal conditions (where each subsequent pass is being made within minutes of the last), swath to swath accuracy is just a few inches. The more lapsed time from one pass to the next may increase the chance for additional error. Keep in mind, driving error is usually greater than GPS error.

Q: What about foam markers and disk markers?

A: The answer is ... use them if they help. The best guidance is whatever works for the operator. The more visual indicators to guide from the better. One thing is certain, GPS guidance will be the primary guidance means and everything else will be secondary.

Q: Can I plant using GPS guidance?

A: GPS guidance is a great planting aid, especially for making the straightest rows possible.

Q: How does weather affect the GPS signal?

A: Weather normally does not affect the GPS signal. This includes rain, sleet, snow, thunderstorms, and wind. Lightning is not a problem unless it is a close strike. A direct lightning strike will damage the unit. Snow and ice accumulation on the antenna can also cause a problem.

Q: How do power transmission lines affect the GPS signal?

A: Normally, high voltage power transmission lines do not affect the GPS signal at all.



About Outback S-Lite

Q: What's the difference between Steering Guide and Current Position?

A: The Steering Guide calculates the nose heading for the driver to steer in order to correctly follow the intended path. Current Position only reports the distance left or right of the intended path. The operator drives using the Steering Guide and checks results using Current Position.

Q: Can I use the Outback S-Lite as a receiver for other uses?

A: Yes. Outback S-Lite accommodates NMEA communication protocol. Contact Outback Guidance Customer Service at any time to get the latest compatibility list.

Q: How long does it take Outback S-Lite to attain a usable signal?

A: It normally takes 1 - 3 minutes. The GPS signal will be acquired first giving a yellow light. DGPS corrections will then be acquired which gives a green light. For e-Dif, it takes 10 minutes to generate corrections. The vehicle can be in motion during this process.

Q: Does the Outback S-Lite have memory?

A: The Outback S-Lite records all movement as long as guidance is on. When you use the STOP GUIDANCE button to pause the job, movement is not recorded. Data recording also stops while you make menu selections. The S-Lite can record up to 30 hours of data. When the job is finished, you can erase the memory. If you need to collect and store historical data, another accessory (such as an Outback 360) is required to be plugged into the Outback S-Lite to perform this function.

Q: How do I erase memory?

A: To erase the memory in the Outback S-Lite, first press the STOP GUIDANCE button. Next, press the down arrow to place the pointer next to ERASE MEMORY. If ERASE MEMORY does not appear, simply press the down arrow until it does. Finally, press the ENTER button to select the function.



Q: What is Straight Guidance?

A: In straight guidance mode, the Outback S-Lite generates perfectly straight, parallel lines based on the first A=B pass. It then records in memory the actual movement over those lines while guiding. A new line can be generated at any time with the Outback S-Lite. Straight guidance can also be used to create circular rows.

Q: What is Contour Guidance?

A: In contour guidance mode, all movement is recorded as the machine moves around. During the first pass, no guidance is given. When the operator makes a second pass, the Outback S-Lite begins to guide along a previous pass. All movement is recorded in memory, unless you press the STOP GUIDANCE button or make selections in the menus.

Q: Can I switch from Straight to Contour in one job?

A: The operator can switch back and forth between straight and contour. Since contour guidance follows other passes, it will attempt to follow any pass that was recorded in the current job regardless if that pass was done in straight mode or contour mode.

Q: How do I perform headlands?

A: This is very easy. Usually headlands are performed in contour mode. Make one pass and then use the guide on the second pass. Do this wherever turning will be done. The Headlands Alert LED lights up on the S-Lite display anytime the antenna crosses a previously applied area.

Q: How do I mark the A=B Line?

A: When doing straight passes, the initial pass is defined by marking two points in the field. The Outback S-Lite will generate a line through the two points defining the first pass. When bordering the edge of a field, mark Point A at one end of the pass and Point B at the other end. When cutting the field in half, mark Point A at the start, start heading in the right direction and mark Point B. Then guide the rest of the way across the field.



Q: Can the Outback S-Lite store a waypoint?

A: A waypoint can be stored so the operator can guide back to that point. It is used primarily when a job is paused. For example, when stopping for a refill the operator would pause the job, save the point, and return back to that point to resume (see "Stopping Guidance" on page 27 for detailed instructions).

Q: How is the console mounted?

A: The console is equipped with a vacuum mount that works great on glass. The best location is directly in front of the operator, immediately above and behind the steering wheel. Wipe the glass with a damp cloth, attach the vacuum mount, then use the swivel and tilt adjustments to get the right viewing angle.

Q: Does bright sunlight affect the display?

A: The display is easily viewable in any ambient light situation. Brightness can be controlled in the menu primarily for dimming at night.

Q: How is the antenna mounted?

A: It is mounted along the front edge of the top of the cab, on the exact centerline of the vehicle. Avoid close proximity to a transmitting radio antenna. Do not drill holes in the cab roof. Use the adhesive plate provided for mounting. Additional plates are available for multiple vehicles.

Q: How does the Outback S-Lite account for implement lag in turns?

A: The Outback S-Lite does not account for implement lag in turns, but this is good as it is assumed turning lag will be about the same on each pass. As long as tractor spacing is correct, implement spacing will follow. This also applies to side hills. Do not attempt to put the antenna on the implement to account for lag.

Q: What electrical power do I need for the Outback S-Lite?

A: A standard DC power supply between 9 and 16 V is required. Current is less than 0.5 A at 12 VDC. The unit will not be damaged by reverse polarity (positive to negative), but it will not operate.

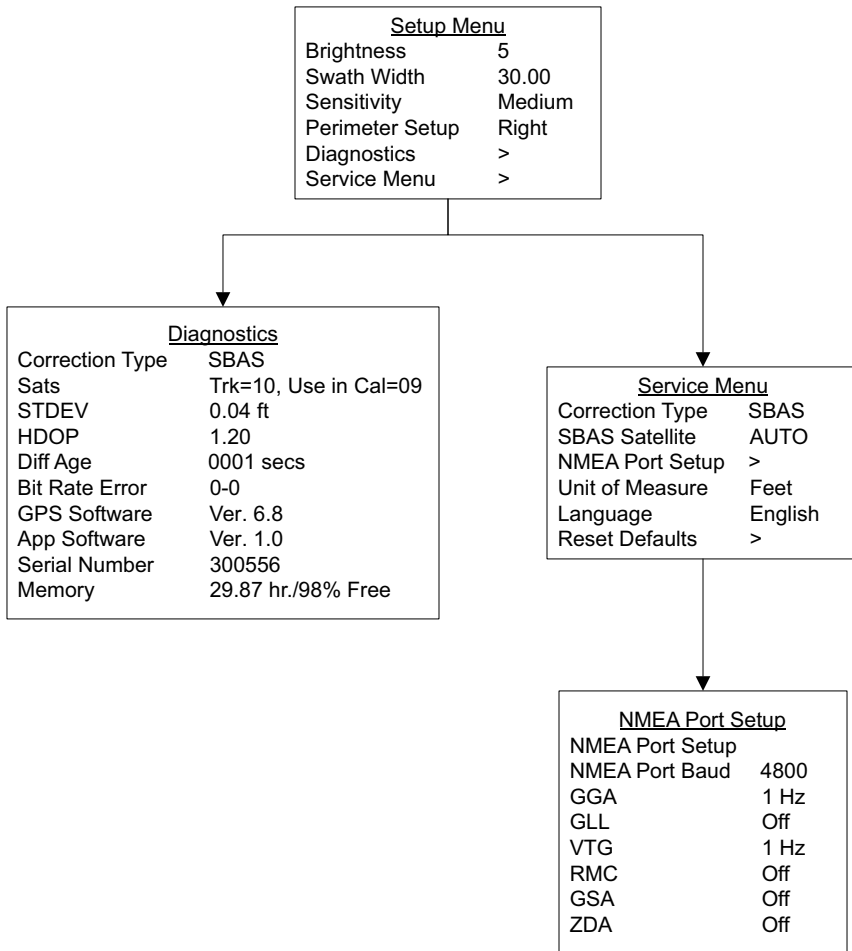




Appendix B: Menu Map

Appendix B: Menu Map

Below is a list of all Outback S-Lite menu items. Access to various menu items depends on the application and/or system components being used.



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The foregoing sets out the entire liability of Hemisphere and the sole obligations of Hemisphere to Licensee in respect of any claim that the Software or its use infringes any third party rights.
20. **INDEMNIFICATION.** Except in relation to an infringement action, Licensee shall indemnify and hold Hemisphere harmless from any and all claims, damages, losses, liabilities, costs and expenses (including reasonable fees of lawyers and other professionals) arising out of or in connection with Licensee's use of the Product, whether direct or indirect, including without limiting the foregoing, loss of data, loss of profit or business interruption.
21. **TERMINATION.** Licensee may terminate this Agreement at any time without cause. Hemisphere may terminate this Agreement on 30 days notice to Licensee if Licensee fails to materially comply with each provision of this Agreement unless such default is cured within

the 30 days. Any such termination by a party shall be in addition to and without prejudice to such rights and remedies as may be available, including injunction and other equitable remedies. Upon receipt by Licensee of written notice of termination from Hemisphere or termination by Licensee, Licensee shall at the end of any notice period (a) cease using the Software; and (b) return to Hemisphere (or destroy and provide a certificate of a Senior Officer attesting to such destruction) the Software and all related material and any magnetic or optical media provided to Licensee. The provisions of Sections 6), 7), 8), 9), 10), 15), 21), 26) and 27) herein shall survive the expiration or termination of this Agreement for any reason.

22. **EXPORT RESTRICTIONS.** Licensee agrees that Licensee will comply with all export control legislation of Canada, the United States, Australia and any other applicable country's laws and regulations, whether under the Arms Export Control Act, the International Traffic in Arms Regulations, the Export Administration Regulations, the regulations of the United States Departments of Commerce, State, and Treasury, or otherwise as well as the export control legislation of all other countries.
23. **PRODUCT COMPONENTS.** The Product may contain third party components. Those third party components may be subject to additional terms and conditions. Licensee is required to agree to those terms and conditions in order to use the Product.
24. **FORCE MAJEURE EVENT.** Neither party will have the right to claim damages as a result of the other's inability to perform or any delay in performance due to unforeseeable circumstances beyond its reasonable control, such as labor disputes, strikes, lockouts, war, riot, insurrection, epidemic, Internet virus attack, Internet failure, supplier failure, act of God, or governmental action not the fault of the non-performing party.
25. **FORUM FOR DISPUTES.** The parties agree that the courts located in Calgary, Alberta, Canada and the courts of appeal there from will have exclusive jurisdiction to resolve any disputes between Licensee and Hemisphere concerning this Agreement or Licensee's use or inability to use the Software and the parties hereby irrevocably agree to attorn to the jurisdiction of those courts. Notwithstanding the foregoing, either party may apply to any court of competent jurisdiction for injunctive relief.
26. **APPLICABLE LAW.** This Agreement shall be governed by the laws of the Province of Alberta, Canada, exclusive of any of its choice of law and conflicts of law jurisprudence.
27. **CISG.** The United Nations Convention on Contracts for the International Sale of Goods will not apply to this Agreement or any transaction hereunder.
28. **GENERAL.** This is the entire agreement between Licensee and Hemisphere relating to the Product and Licensee's use of the same, and supersedes all prior, collateral or contemporaneous oral or written representations, warranties or agreements regarding the same. No amendment to or modification of this Agreement will be binding unless in writing and signed by duly authorized representatives of the parties. Any and all terms and conditions set out in any correspondence between the parties or set out in a purchase order which are different from or in addition to the terms and conditions set forth herein, shall have no application and no written notice of same shall be required. In the event that one or more of the provisions of this Agreement is found to be illegal or unenforceable, this Agreement shall not be rendered inoperative but the remaining provisions shall continue in full force and effect.

Warranty Notice

COVERED PRODUCTS: This warranty covers all products manufactured by Hemisphere GPS and purchased by the end purchaser (the "Products"), unless otherwise specifically and expressly agreed in writing by Hemisphere GPS.

LIMITED WARRANTY: Hemisphere GPS warrants solely to the end purchaser of the Products, subject to the exclusions and procedures set forth below, that the Products sold to such end purchaser and its internal components shall be free, under normal use and maintenance, from defects in materials, and workmanship and will substantially conform to Hemisphere GPS's applicable specifications for the Product, for a period of 12 months from delivery of such Product to such end purchaser (the "Warranty Period"). Repairs and replacement components for the Products are warranted, subject to the exclusions and procedures set forth below, to be free, under normal use and maintenance, from defects in material and workmanship, and will substantially conform to Hemisphere GPS's applicable specifications for the Product, for 90 days from performance or delivery, or for the balance of the original Warranty Period, whichever is greater.

EXCLUSION OF ALL OTHER WARRANTIES. The LIMITED WARRANTY shall apply only if the Product is properly and correctly installed, configured, interfaced, maintained, stored, and operated in accordance with Hemisphere GPS's relevant User's Manual and Specifications, AND the Product is not modified or misused. The Product is provided "AS IS" and the implied warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE and ALL OTHER WARRANTIES, express, implied or arising by statute, by course of dealing or by trade usage, in connection with the design, sale, installation, service or use of any products or any component thereof, are EXCLUDED from this transaction and shall not apply to the Product. The LIMITED WARRANTY is IN LIEU OF any other warranty, express or implied, including but not limited to, any warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE, title, and non-infringement.

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GOVERNING LAW. This agreement and any disputes relating to, concerning or based upon the Product shall be governed by and interpreted in accordance with the laws of the State of Arizona.

OBTAINING WARRANTY SERVICE. In order to obtain warranty service, the end purchaser must bring the Product to a Hemisphere GPS approved service center along with the end purchaser's proof of purchase. Hemisphere GPS does not warrant claims asserted after the end of the warranty period. For any questions regarding warranty service or to obtain information regarding the location of any of Hemisphere GPS approved service center, contact Hemisphere GPS at the following address:

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